Electricity Engineers' Association

Level 6
138 The Terrace
PO Box 5324
Wellington, New Zealand
Telephone: (04) 473 8600
Facsimile: (04) 473 8601
Web: www.eea.co.nz

9 December 2016

Electricity Authority
Level 7
ASB Bank Tower
2 Hunter Street
PO Box 10041
Wellington 6143
New Zealand

Emailed to: info@ea.govt.nz

Proposal to amend the Electricity Industry Participation Code 2010– Criteria for connection of distributed generation under the Part 1A application process.

The significant increased uptake over the last several years of residential Photo-Voltaic (PV) panels and inverter systems, with the capability of exporting surplus electricity into Line Company networks in New Zealand, has been the main driver for the development of the *EEA Guideline for the Connection of Small-Scale Inverter Based Distributed Generation*.

The EEA has commissioned the production of this Guide to promote a consistent approach to managing the connection of PV-Inverter systems in a safe, efficient and equitable manner throughout NZ which will enable customers to invest in confidence without creating overloading, power quality and safety issues for local networks. This document outlines a structured assessment process for DG applications and specifies the minimum technical requirements that must be met in the design and installation of Inverter Energy Systems (IES) to ensure safe and reliable operation of the LV distribution networks.

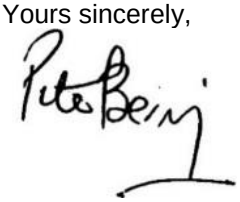
To realise the benefits of a streamlined assessment process, as proposed in the guide, the industry requires the support of a more robust framework of preliminary provisions in schedule 6 of the Electricity Industry Participation Code. In practice, the proposed changes will mean that distributed generation applicants will only be allowed to apply for connection under Part 1A if the inverter is AS/NZS 4777.2 compliant, has the volt-var and volt-watt response modes, and has a power export below a threshold specified by the distributor. These changes would allow networks using the guide methodology to:

- Fast track applications with confidence
- Take advantage of inverter operational modes address congestion
- Avoid uneconomic remediation work as DG penetration levels increase

As part of the EEA Guide development process the Green Grid group engaged with the Electricity Authority when it became clear an amendment to the Electricity Industry Participation Code was required. Both Ron Beatty and Roger Miller have been involved and discussed the Code changes with Dr Allen Miller and his GREEN Grid research team and their Network Advisory Group (NAG) at Canterbury University. As an outcome and continuation of that discussion EEA wish submit a proposed amendment (attached) to Schedule 6 of the Electricity Industry Participation Code.

We are happy to discuss or clarify any matters regarding this proposed amendment - please contact Juliet Clendon at juliet@eea.co.nz or 04 4738 600.

Yours sincerely,



Peter Berry
Executive Director

Level 7, ASB Bank Tower, 2 Hunter Street, PO Box 10041, Wellington, New Zealand
Phone: 04 460 8860
Fax: 04 460 8879
info@ea.govt.nz

Proposal to amend the Electricity Industry Participation Code 2010

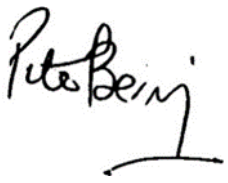
Send to info@ea.govt.nz or fax to 04 4608879

This form is to propose:

☒ An amendment to an existing clause in the Electricity Industry Participation Code 2010; or
☐ A new clause in the Electricity Industry Participation Code 2010.

Please complete as many sections of this form as possible and email or fax it to the above number/email address. The more information you include in your proposal, the faster your proposal will be able to be assessed/progressed.

Proposer's details

Name:	Peter Berry
Position in company:	CEO
Company:	Electricity Engineers' Association of NZ
Telephone:	+64 4 473 8600
Email address:	peter@eea.co.nz
Signature:	
Date:	9/12/2016

The proposal / preferred option

Suggested proposal name (please keep it short)	Criteria amendment regarding eligibility for connection of distributed generation under the Part 1A application process.
State the objective of your proposal.	In response to new inverter technological capability and expected increasing levels of small-scale distributed generation leading to possible export congestion, the objective is to provide sufficient technical criteria for allowing connection of distributed generation under the Schedule 6.1 Part 1A fast-track application process.
Does the proposal relate to an existing Code clause? If yes, please state the full clause reference.	Yes, Schedule 6.1 Clause 1D, and Clause 9B(2).
Describe the specific amendment(s) that you propose be made to the Code *OR* attach a draft of the proposed Code amendment (optional). Note the Code drafting manual provides guidance on drafting.	**See attached draft**. In practice, the proposed changes will mean that distributed generation applicants will only be allowed to apply for connection under Part 1A if the inverter is AS/NZS 4777.2 compliant, has the volt-var and volt-watt response modes, and has a power export below a threshold specified by the distributor (above this export threshold a manual assessment is required via Part 1). These are suitable amendments for allowing auto-assessment under Part 1A. All other applications would be processed under the regulatory process of Part 1.

Identify how your proposal would support the Authority's objective, as set out in section 15 of the Electricity Industry Act 2010 (Act)[i], specifically addressing the competition, reliability and efficiency dimensions of the objective.	The simplified and fast-track application process of Part 1A has been created with the assumption that connection of inverter based distributed generation (DG) under 10 kW does not require technical assessment (beyond Clause 1D) during the application process (except for the case where the location of the distributed generation has already been publically listed as being congested - see Clause 9D). It has essentially been designed for auto-assessment. This assumption of minimal technical assessment may be considered reasonable given the very low level of DG penetration today, but this is unlikely to be technically acceptable as DG intensifies. Under Part 1A, a distributor has very little time to perform a manual assessment if the distributor sees this as necessary. If the distributor then wishes mitigation measures to be applied during the application process, the distributor has no regulatory power to enforce those measures. The distributed generator only needs to comply with the requirements of Clause 1D. Distributors cannot enforce the deployment of new inverter technology (i.e. inverter operational modes, particularly the volt-var response mode) where required, that can mitigate the network problems that can arise with increased DG power export. An objective of the simplified Part 1A process, as set out in the executive summary of the Electricity Authority's *Connection of small scale distributed generation (equal to or less than 10 kW) to a local network* guideline, is to lower transaction costs to improve the efficiency of the industry. This is currently achieved by a lower application fee, faster application processing time, and the ability of the distributor to effectively auto-assess the application with minimal technical assessment. The proposal addresses the efficiency dimension by still maintaining cost-effective auto-assessment of applications. The reliability of LV networks is improved by the adoption of this proposal as it provides for: (i) enforced use, where required, of new inverter technology (e.g. volt-var response modes) to mitigate problems such as voltage rise which occur due to export congestion; and (ii), a criterion based on the applicant's proposed export power that determines when a manual technical assessment is required. If this criterion is not met, application must be made under the Part 1 application process. Part 1 allows for sufficient time to perform manual assessments, and provides distributors with the ability to enforce any mitigation measures arising from manual assessment. As a result, reliability would be improved. Another objective of the simplified Part 1A process, as set out in the executive summary of the Electricity Authority's *Connection of small scale distributed generation (equal to or less than 10 kW) to a local network* guideline, is to lower a barrier to small-scale DG competing in the generation market. The proposal does not diminish this objective, and thereby addresses the competition dimension.
Which of the purposes listed in section 32(1) of the Act does your proposal most closely relate to?	(b) the reliable supply of electricity to consumers

Identify whether you consider your proposed change to be urgent, providing supporting rationale.	Urgent, as the *traffic light system* of connection requirements for DG in the EEA's *Guideline for the Connection of Small-Scale Inverter Based Distributed Generation* cannot be implemented by distributors using both Part 1A and Part 1 until the proposal's Code changes are completed. This traffic light system can only be implemented currently using Part 1. Part 1A also presents a regulatory loop-hole due to its inability to enforce sufficient connection requirements where necessary, until this occurs.
Please set out the expected costs and benefits of your proposal. These should include your assessment of the direct cost to develop and implement the proposed Code amendment, and the consequential costs and benefits as a result of the amendments, to all affected parties.	There is no significant direct cost to develop and implement the proposed Code amendment. There is a consequential benefit that the *traffic light system* of connection requirements for DG in the EEA's *Guideline for the Connection of Small-Scale Inverter Based Distributed Generation* can be fully implemented by distributors using both Part 1A and Part1. A further consequential benefit is that the appropriate implementation of DG connection requirements under Part 1A resulting from the proposal will enable the aggregate export power capacity of LV networks to be more fully realized where DG intensity is high, thus in turn enabling deferment of network reinforcement. This reduces cost for DG owners.
Who is likely to be substantially affected by this proposal?	Distributors, DG owners, and to a lesser extent all consumers on a LV network where DG is installed.
Identify whether you consider (providing supporting rationale): (i) your proposed change to be technical and non-controversial; or (ii) there is widespread support for your proposed change among the people likely to be affected; or (iii) there has been adequate prior consultation so that all relevant views have been considered.	There is (ii) widespread support for the proposed change among the GREEN Grid's Network Analysis Group, which comprises of representatives of Orion, WEL Networks, Network Tasman, Unison, Electricity Authority, Marlborough Lines, Vector, Transpower, Mainpower, Mitton Electronet, Powerco, and Northpower.
Why this is your proposed option?	The GREEN Grid's Network Analysis Group considers that Part 1A has merit and should be retained. However, a regulatory loop hole currently exists whereby essentially any application to connect DG (that includes a AS/NZS 4777.2 compliant inverter under Clause 1D) has to be approved, even if manual assessment or specific mitigation measures may be required. The proposed change closes this loop hole.
Any other relevant information you would like the Authority to consider.	

Assessment of alternative options

Please list and describe any alternative means of achieving the objective you have described for your proposal. For each alternative, please provide the information in the table below (i.e. repeat this table below for each alternative). The list of alternatives should include both regulatory (i.e. Code amendments) and non-regulatory options (e.g. education, information, voluntary compliance). If you have a preferred option please identify it and explain why it is your preferred option.

Brief description of an alternative means of achieving the objective. Note if this is your preferred option.	Remove Schedule 6.1 Part 1A from the Code.
The extent to which the objective of your proposal would be promoted or achieved by this option.	As explained above, a regulatory loop hole currently exists under Part 1A, whereby essentially any application to connect DG (that includes an AS/NZS 4777.2 compliant inverter under Clause 1D) has to be approved, even if manual assessment or specific mitigation measures may be required. The removal of Part 1A eliminates this problem. All applications would then be processed via Part 1, which allows for the enforcement of sufficient technical requirements for connecting DG.
Who is likely to be substantially affected by this option?	Applicants wishing to connect DG.
The expected costs and benefits of this option, including direct costs to develop it, and consequential costs and benefits to all affected parties.	There is no significant direct cost to develop and implement this option. There is a reduced consequential benefit, in that the *traffic light system* of connection requirements for DG in the EEA's *Guideline for the Connection of Small-Scale Inverter Based Distributed Generation* can be implemented by distributors using only Part1. A further consequential benefit is that the appropriate implementation of DG connection requirements resulting from the proposal will enable the aggregate export power capacity of LV networks to be more fully realized where DG intensity is high, thus in turn enabling deferment of network reinforcement. This reduces cost for DG owners. There is a consequential cost to DG applicants in the form of a higher application fee under Part 1 ($200), and a longer processing time.

[i] ***Section 15: Objective of Authority***

The objective of the Authority is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

DRAFT amendment proposal - Criteria amendment regarding eligibility for connection of distributed generation under the Part 1A application process (EEA).

Note: proposed Code amendments are in blue

Schedule 6.1, Preliminary Provisions:

1D When application may be made under Part 1A
A **distributed generator** may elect to apply to a **distributor** under Part 1A instead of Part 1 if the **distributed generation** to which the application relates—

(a) is designed and installed in accordance with AS 4777.1; and
(b) incorporates an inverter that
    (i) has been tested and issued a Declaration of Conformity with AS/NZS 4777.2 by a laboratory with accreditation issued or recognised by International Accreditation New Zealand; and
    (ii) can perform the **inverter operational modes** that may be required according to the **distributor's connection and operation standards**; and
(c) has protection settings that meet the **distributor's connection and operation standards**; and
(d) has a **maximum export power** that is less than an export power threshold specified by the **distributor**, at the **distributed generation's** location. This criterion (Clause 1D(d)) does not apply if the **distributor** does not publish an export power threshold.

With the following definitions added to the Code Part 1 – Preliminary Provisions:

inverter operational modes means modes of operation of an inverter which will contribute to **export congestion** management or to maintaining the power quality, in the vicinity of the **distributed generation's ICP**. These various operating modes, if available, may be enabled or disabled in an inverter and may include, but not be limited to, the following as described by AS/NZS 4777.2: (a) power quality response modes including volt-var and volt-watt, fixed power factor or reactive power mode, power response mode, and power rate limit, (b) demand response modes, and (c) multiple mode inverter operation.

maximum export power means the maximum **active power** exported into the **local network** (or **embedded network** as the case may be) at the **distributed generation's ICP**, being equal to the **nameplate capacity** minus the minimum load at the **point of connection**, or to the power export limit imposed by an active export control device, specified in Watts.

Schedule 6.1, Part 1A:

9B Application for distributed generation of 10 kW or less in total in specified circumstances

(2) An application must include the following:

(a) the name, contact, and address details of the **distributed generator** and, if applicable, the **distributed generator's** agent:

(b) a brief description of the physical location at the address at which the **distributed generation** is or will be **connected**:

(c) any application fee specified by the **distributor** in accordance with clause 6.3(2)(e):

(d) details of the make and model of the inverter:

(e) confirmation as to whether the inverter—

(i) is included on the **distributor's** list of approved inverters made publicly available under clause 6.3(2)(f); or

(ii) conforms with the protection settings specified in the **distributor's connection and operation standards**; and

(iii) can perform the **inverter operational modes** that may be required according to the **distributor's connection and operation standards**:

(f) if the inverter is not included on the **distributor's** list of approved inverters, a copy of the AS/NZS 4777.2 Declaration of Conformity certificate for the inverter:

(g) details of—

(i) the **nameplate capacity** of the **distributed generation**; and

(ii) the fuel type of the **distributed generation** (for example, solar, wind, or liquid fuel); and

(iii) the **maximum export power** of the **distributed generation**.